DISTRIBUTION AND ABUNDANCE OF COLONIAL WATERBIRDS NESTING IN THE CANADIAN PORTIONS OF THE LOWER GREAT LAKES SYSTEM IN 1990

Environment Canada Environnement

Technical report series (Canadian Wildlife Service)
No: 117 Date: 1991

SK 470 T42
ODFF

Z0460B0
ExC 1

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TECHNICAL REPORT SERIES No. 117
Ontario Region 1991
Canadian Wildlife Service

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Ontario Region 1991
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This series may be cited as:

Blokpoel, H.; Tessier, G.D. 1991
Distribution and abundance of colonial waterbirds nesting in the Canadian portions of the lower Great Lakes system in 1990.
Technical Report Series No. 117. Canadian Wildlife Service, Ontario Region.

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93-01698/

Published by Authority of the
Minister of Environment
Canadian Wildlife Service

© Minister of Supply and Services Canada 1991
Catalogue No. CW69-5/117E
ISBN 0-662-18523-4
ISSN 0831-6481

Copies may be obtained from:

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ABSTRACT

The Canadian portions of the lower Great Lakes system (St. Clair River, Lake St. Clair, Detroit River, Lake Erie, Niagara River, Lake Ontario, and the St. Lawrence River from Kingston to Cornwall) were surveyed during the 1990 breeding season and nest counts were made at all colonies of Double-crested Cormorant (Phalacrocorax auritus), Ring-billed Gull (Larus delawarensis), Herring Gull (L. argentatus), Great Black-backed Gull (L. marinus), Common Tern (Sterna hirundo), and Caspian Tern (S. caspia).

In 1990 the breeding populations for these six colonial waterbird species were as follows. Double-crested Cormorant: 11 colonies (with 4,698 nests); Ring-billed Gull: 27 colonies (with 283,405 nests); Herring Gull: 36 colonies (with 5,507 nests); Great Black-backed Gull: 3 colonies (with 8 nests); Common Tern: 13 colonies (with 2,348 nests); and Caspian Tern: 3 colonies (with 765 nests).

During 1976/77-1990, average annual rates of change of population size were as follows: Double-crested Cormorant: + 40.4%; Ring-billed Gull: between +12.3% and +13.3%; Herring Gull: between +8.1% and +8.7%; Common Tern: between -1.9% and -2.0%; and Caspian Tern: +22.1%. These observed population changes are briefly discussed.

RÉSUMÉ

Un relevé de la partie canadienne du réseau hydrographique inférieur des Grands Lacs (la rivière Saint-Clair, le lac Saint-Clair, la rivière Détroit, le lac Érié, la rivière Niagara, le lac Ontario et le tronçon du fleuve Saint-Laurent entre Kingston et Cornwall) a été effectué pendant la saison de reproduction de 1990, et les nids ont été dénombrés dans toutes les colonies de Cormorans à aigrettes (Phalacrocorax auritus), de Goélands à bec cerclé (Larus delawarensis), de Goélands argentés (L. argentatus), de Goélands à manteau noir (L. marinus), de Sternes pierregarin (Sterna hirundo) et de Sternes caspiennes (S. caspia).

En 1990, pour ces six espèces aquatiques coloniales, les populations d'oiseaux nicheurs étaient les suivantes: Cormorans à aigrettes, 4 689 nids (11 colonies); Goélands à bec cerclé, 283 405 nids (27 colonies); Goélands argentés, 5 507 nids (36 colonies); Goélands à manteau noir, 8 nids (3 colonies); Sternes pierregarins, 2 348 nids (13 colonies), et Sternes caspiennes, 765 nids (3 colonies).

Pour la période de 1976-1977 à 1990, la moyenne des taux annuels de changement de la population a été la suivante: Cormorans à aigrettes, +40,4 %; Goélands à bec cerclé, de +12,3% à +13,3%; Goélands argentés, de +8,1% à +8.7%; Sternes pierregarin, de -1,9% à -2,0%, et Sternes caspiennes, +22,1%. Ces changements de population observés sont brièvement discutés.

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1. INTRODUCTION

Colonial waterbirds are of special concern to the Canadian Wildlife Service (CWS) because during the nesting season they are concentrated on their colony sites and are then highly vulnerable to predation and disturbance. In addition, as top predators in the food web, they may bio-accumulate contaminants that are present in their environment, and, therefore, they can be used to monitor contaminant levels and their bio-effects. In the Great Lakes, contaminant levels in Herring Gulls eggs have been monitored routinely since the early 1970s (Mineau et al. 1984).

Large-scale inventories of colonial waterbirds nesting on the Great Lakes did not begin until 1976. In 1976, and again in 1977, the U.S. portions of the Great Lakes were surveyed under contract for the U.S. Fish and Wildlife Service (USFWS) (Scharf et al. 1978). The Canadian portions of the Great Lakes were surveyed and censused in a more gradual fashion: Lake Ontario and the upper St. Lawrence River in 1976 (Blokpoel 1977), Lake Erie and adjacent waterbodies in 1977 (Blokpoel and McKeating 1978), Lake Superior in 1978 (Blokpoel et al. 1980) and Lake Huron, including Georgian Bay and the North Channel, in 1980 (Weseloh et al. 1986). During 1981-1988 certain areas were re-inventoried during one or more years (e.g. Blokpoel and Harfenist 1986, Weseloh et al. 1988).

A lakes-wide inventory of all colonial waterbird species on both sides of the Canada/US border began in 1989. The inventory is done in close cooperation between CWS and USFWS. In Canada the work is coordinated by CWS (Ontario Region) and is largely carried out by contractors with substantial assistance from the Ontario Ministry of Natural Resources and the Canadian Parks Service. Because of the large amount of work and cost involved in making an inventory of all the Great Lakes it was decided to attempt a 3-year effort with fieldwork as follows: 1989 - all "primary" species in the upper Great Lakes; 1990 - all "primary" species in the lower Great Lakes; and 1991 - all "secondary" species in all Lakes. For the purpose of the inventory, "primary" species are species that nest primarily (or originally) on sparsely vegetated islands and off-shore structures, i.e. Double-crested Cormorant (Phalacrocorax auritus), Ring-billed Gull (Larus delawarensis), Herring Gull (L. argentatus), Great Black-backed Gull (L. marinus), Common Tern (Sterna hirundo) and Caspian Tern (S. caspia). "Secondary" species are species that nest primarily in marshes and on densely vegetated islands, i.e. Great Blue Heron (Ardea herodias), Great Egret (Casmerodius albus), Cattle Egret (Bubulcus ibis), Little Blue Heron (Egretta caerulea), Snowy Egret (E. thula), Black-crowned Night-Heron (Nycticorax nycticorax), Forster's Tern (Sterna forsteri) and Black Tern (Chlidonias niger).

Plans call for interim reports by CWS for the annual efforts in the Canadian Great Lakes with a comprehensive joint CWS/USFWS atlas-like report sometime after 1991. The 1989 inventory of Canadian Lakes Superior and Huron involved several hundred, usually small, colonies.

The 1990 inventory of the lower Great Lakes system involved fewer than 60 colonies but several of these are very large. Because large gull colonies are present in Ontario's most heavily populated area, there are often conflicts between the interests of people and those of gulls (reviewed by Blokpoel and Tessier 1986). Many planners and consultants are requesting information on locations and sizes of gull colonies in the lower Great Lakes area and we therefore decided to publish this report on our 1990 work ahead of the planned report of our 1989 work. Here we present the findings of the 1990 inventory of the "primary" species and we briefly compare these data with results from previous inventories.

2. STUDY AREA AND METHODS

For the purpose of this report, the lower Great Lakes system consists of the St. Clair River, Lake St. Clair, the Detroit River, Lake Erie, Niagara River, Lake Ontario, and the St. Lawrence River downstream to Cornwall, Ontario (Fig. 1 and 2).

The time for carrying out the fieldwork is short: colonies should be visited late in incubation (to ensure that most birds are on eggs) but before hatching (to prevent chick mortality). In order to cover the entire lower Great Lakes system we divided it in four sections. Each section was covered by one team of two people (to make nest counts) and one boat handler (who might help with the nest count depending on weather conditions, etc.). The sections were surveyed by boat, except for the Detroit and St. Clair Rivers which were surveyed from shore. Colonies in the Niagara River were visited by a helicopter early in the season and observed from shore later on.

To facilitate the counting of nests, colonies were temporarily sub-divided in parallel "strips" using smooth brightly-coloured plastic tapes. Width of the strips varied according to nest-density and degree of vegetation cover. Nest counters walked down the "strips" and counted nests using hand counters. All nests with eggs and/or chicks were counted. In addition, contents of nests, including empty ones, were recorded for small sample areas to provide an idea of the phase of nesting. Nests of tree-nesting cormorants were counted by putting marker tape around a nesting tree and then counting all nests in that tree before proceeding to the next tree. For the purpose of this report, a colony consists of one or more nests of a species that usually nests in groups.

To determine rates of change in population size in recent years, we used the data from the 1990 inventory and those from the inventories carried out in 1976 (Lake Ontario) and 1977 (Lake Erie). Because the earlier data were gathered over a 2-year period it is impossible to calculate the exact annual growth rate during the period 1976/77 to 1990. However, we combined the totals for the 1976 and 1977 inventories and used that figure to calculate average annual growth rates during 1976-1990 (yielding minimum estimates) and during 1977-1990 (yielding maximum estimates).

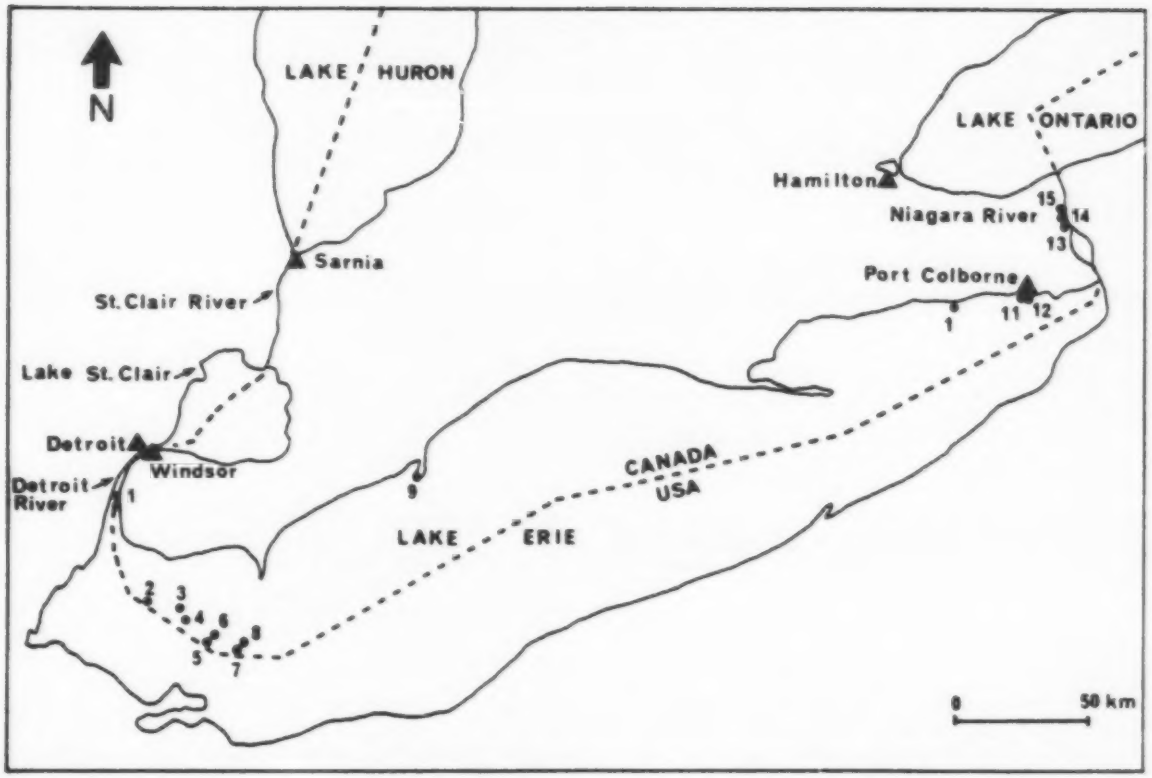

Fig. 1. Map showing locations of colonies of waterbirds in the Canadian portions of the Detroit River, Lake Erie, and the Niagara River in 1990. Numbers refer to Table 1.

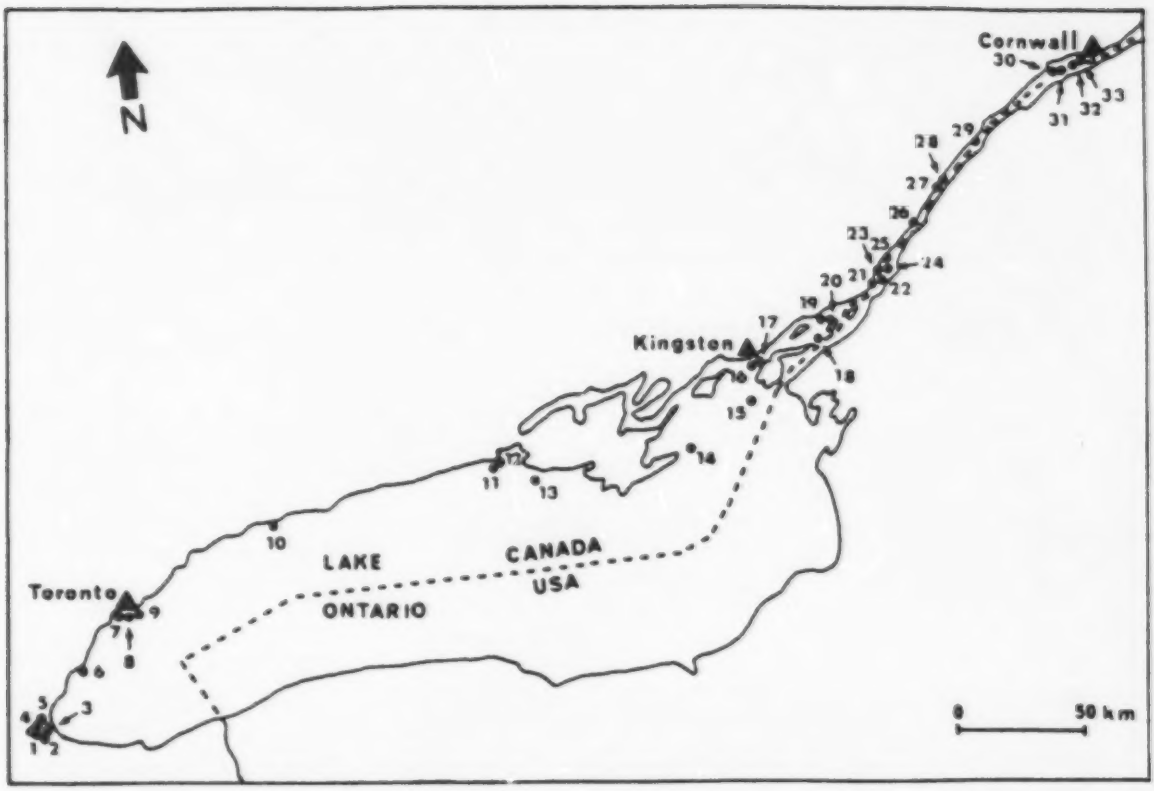

Fig. 2. Map showing locations of colonies of waterbirds in the Canadian portions of Lake Ontario and the upper St. Lawrence River in 1990. Numbers refer to Table 1.

3. RESULTS

The 1990 inventory results are shown in Table 1. Middle Sister Island was not visited in 1990 because of weather conditions. Based on visits during earlier years, it is virtually certain that Herring Gulls nested there in 1990, but Ring-billed Gulls and terns most likely did not, nor, to the best of our knowledge, did cormorants (Weseloh et al. 1988 and unpublished data).

3.1 Double-crested Cormorant

This species was the third most numerous with 7 colonies on Lake Ontario and 4 on Lake Erie. Of the 11 colonies (with 4,698 nests), 1 (with 250 nests) was on human-made habitat and the remainder on more or less natural habitat. Since 1976, the nesting population on Lake Ontario and Lake Erie has exploded: there was an 82-fold increase in nest numbers during the period 1977-1990 (Table 2) or an average annual growth rate of 40.4%.

3.2 Ring-billed Gull

Ring-bills were by far the most numerous species with over 280,000 pairs. Of the 27 colonies (with 283,405 nests), 13 colonies (with 189,045 nests) were on habitat that was either made or totally altered by humans. During the period 1976-77 to 1990 the population increased 5-fold (Table 3) or an average annual growth rate between 12.3 and 13.3%. Ring-billed Gulls are very gregarious and once they have colonized a new suitable site, their numbers tend to increase very rapidly.

3.3 Herring Gull

Herring Gulls nested throughout the study area and occupied the largest number of colony sites. However, their colonies were usually fairly small and the total number of nests was about 50 times smaller than that of the Ring-bills (Table 1). Of the 36 colonies (with 5,507 nests), 11 (with 869 nests) were on human-made or human-altered habitat. Excluding Lake Erie, for which data were incomplete, Herring Gull numbers in the study area have increased about threefold since 1976-77 (Table 4) or an average annual growth rate between 8.1 and 8.7%.

3.4 Great Black-backed Gull

There were only 8 nests of this species: one site in the St. Lawrence River had 1 nest, and the two sites in eastern Lake Ontario held 2 and 5 nests, respectively (Table 1). From Table 5 it appears as if Great Black-backed Gulls have begun nesting in Lake Ontario since 1976, but an occasional pair may have gone unnoticed during the 1976 inventory and gulls may have nested late in the season after the inventory took place.

3.5 Common Tern

Colonies of this species were present only in western Lake Ontario and the St. Lawrence River. Of the 13 colonies (with 2,348 nests), 5 (with 2,083 nests) were on human-made or human-altered habitat. Common Tern numbers have declined since 1976-77 in all sections of the study area (Table 6) with an overall drop of 23.7% in nesting pairs, or an average annual rate of decline between 1.9 and 2.0%.

3.6 Caspian Tern

This species nested in only 3 colonies, all located in Lake Ontario (Table 1). Of the 3 colonies (with 765 nests), 1 (with 184 nests) was on human-made habitat. The total number of nesting pairs in Canadian Lake Ontario has increased more than 16 times during the period 1976-77 to 1990 (Table 7), or an average annual growth rate of 22.1%.

4. DISCUSSION

4.1 Double-crested Cormorant

On the lower Great Lakes cormorants are increasing rapidly (Price and Weseloh 1986), as is the case on the upper Great Lakes (Scharf and Shugart 1981, Ludwig 1984). During the 1960s and early 1970s the nesting population declined steadily. The decline was associated with poor reproductive success and toxic contamination (Postupalski 1978, Weseloh et al. 1983, Ludwig 1984). The current population increase is probably the result of a combination of factors including reductions in contaminant levels and in human persecution, immigration, early age of first breeding and low annual mortality, and the abundance of prey fish (Blokpoel et al. 1980, Ludwig 1984, Price and Weseloh 1986).

The colony in Hamilton Harbour, which started in 1984 (Dobos et al. 1988), is noteworthy in that it represents the first site where the cormorants are nesting on human-made habitat in an urbanized area. A second colony on artificial habitat (3 nests at Tommy Thompson Park in 1990) was a nesting attempt only; adults were copulating on nests but there were no eggs. We therefore did not include this colony in Table 1.

In the upper Great Lakes cormorants have become a nuisance to fishermen (Craven & Lev 1985, 1987) and in U.S. Lake Ontario cormorants are creating concern among fishermen as well (Carroll 1988). Cormorants in the upper Great Lakes do not eat significant amounts of fish of commercial value (Ludwig et al. 1989), and the same is most likely the case in the lower lakes.

4.2 Ring-billed Gull

As adaptable generalists, ring-bills thrive in the human landscape. Many gulls have become urbanized in that they feed, nest and rest in or near urban and suburban areas. The increasing gull numbers

Table 1 Numbers of active nests of colonial waterbirds in the Canadian portions of the lower Great Lakes system in 1990. DCCO - Double-crested Cormorant; BCNH - Black-crowned Night-Heron; HERG - Herring Gull; RBGU - Ring-billed Gull; GBBG - Great Black-backed Gull; COTE - Common Tern; CATE - Caspian Tern. Colony locations are plotted on Figures 1 and 2.

Area	DCCO	RBGU	HERG	GBBG	COTE	CATE
Detroit River						
1. Fighting I.	0	34,021	195	0	0	0
Subtotal: nests	0	34,021	195	0	0	0
colonies	0	1	1	0	0	0
Lake Erie						
2. Middle Sister I.	- - - - - - - - not visited in 1990 - - - - - - - -					
3. North Harbour I .	0	0	41	0	0	0
4. East Sister I.	1,715	0	1,556	0	0	0
5. Big Chicken I.	0	0	174	0	0	0
6. Hen I.	0	0	70	0	0	0
7. Middle I.	237	0	1,981	0	0	0
8. Pelee I.	2	0	0	0	0	0
9. Rondeau Prov. Park	0	50	0	0	200	0
10. Mohawk I.	2	2,068	204	0	0	0
11. Pt. Colborne Mainland	0	43,590	32	0	0	0
12. Pt. Colborne Breakwater	0	2,500[1]	145	0	935	0
Subtotal: nests	1,956	48,208	4,203	0	1,135	0
colonies	4	4	8	0	2	0
Niagara River						
13. Sunken barge	0	0	4[1]	0	0	0
14. Two unnamed islands	0	0	100[1]	0	0	0
15 Table Rock I.	0	400[1]	0	0	0	0
Subtotal: nests	0	400	104	0	0	0
colonies	0	1	3	0	0	0
Lake Ontario						
1. Hamilton Harb, Stelco	0	188	4	0	246	0
2. Hamilton Harb, Windermere	0	37	3	0	776	0
3. Hamilton Harb, East Port	250	38,773	297	0	0	184
4. Hamilton Harb, Farr I.	0	166	39	0	0	0
5. Hamilton Harb, Neare I.	0	457	0	0	6	0
6. Lakeview TGS, Mississauga	0	876	6	0	0	0
7. Muggs' I., Tor.	0	2,307	7	0	0	0

Table 1 (Cont'd)

Area	DCCO	RBGU	HERG	GBBG	COTE	CATE
8. T. Thompson Park, Tor.	0	47,799	96	0	120	0
9. Ashbridge's Bay Park, Tor.	0	150[1]	0	0	0	0
10. Bowmanville	0	825	0	0	0	0
11. High Bluff I.	888	31,805	4	0	0	0
12. Gull I.	704	37,612	85	2	0	102
13. Scotch Bonnet I.	0	0	157	0	0	0
14. Swetman I.	137	6,581	45	0	0	0
15. Pigeon I.	638	5,017	55	5	0	479
16. Salmon I.	14	119	17	0	0	0
17. Snake I.	111	0	92	0	0	0
Subtotal: nests	2,742	172,712	907	7	1,148	765
colonies	7	15	14	2	4	3
St. Lawrence River						
18. Black Ant I.	0	639	1	0	0	0
19. Jackstraw Shoal	0	0	0	0	9	0
20. Shoal off Ft. Wallace I.	0	0	0	0	9	0
21. Channel I.	0	0	1	0	30	0
22. Little Corn I.	0	0	1	0	3	0
23. Ice I.	0	0	1	0	2	0
24. Gull Island Shoal	0	0	12	0	0	0
25. Griswold I.	0	0	18	0	0	0
26. Shoal SE of Stovin I.	0	0	0	0	6	0
27. McNairn I.	0	5,768	0	0	0	0
28. Murray I.	0	607	14	0	0	0
29. Spencer Island Pier	0	0	0	0	6	0
30. Island W of Sheek I.	0	1,356	1	0	0	0
31. Bergin I.	0	31	0	0	0	0
32. Island E of Sheek I.	0	0	1	0	0	0
33. Strachan Islands	0	19,663	48	1	0	0
Subtotal: nests	0	28,064	98	1	65	0
colonies	0	6	10	1	7	0
Grand total: nests	4,698	283,405	5,507	8	2,348	765
colonies	11	27	36	3	13	3

[1] Estimate

Table 2. Changes in nest numbers of Double-crested Cormorants on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	0	0	0	0
Lake Erie ('77)[1]	1	57	4	1,956
Niagara River ('77)[1]	0	0	0	0
Lake Ontario ('76)[2]	0	0	7	2,742
St. Lawrence River ('76)[2]	0	0	0	0
Totals	1	57	11	4,698

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977

Table 3. Changes in nest numbers of Ring-billed Gulls on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	0	0	1	34,021
Lake Erie ('77)[1]	5	14,730	4	48,208
Niagara River ('77)[1]	1	400[3]	1	400[3]
Lake Ontario ('76)[2]	4	40,787	15	172,712
St. Lawrence River ('76)[2]	0	0	6	28,064
Totals	10	55,917	27	283,405

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977
[3] Estimate

Table 4. Changes in nest numbers of Herring Gulls on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	1	48	1	195
Lake Erie ('77)[1]	5	≥ 993	8	4,203
Niagara River ('77)[1]	7	38[3]	3	104
Lake Ontario ('76)[2]	8	309	14	907
St. Lawrence River ('76)[2]	7	45	10	98
Totals	23[4]	440[4]	28[4]	1,304[4]

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977
[3] Four nests on cliffs in the Niagara River Gorge and 34 on two unnamed islands and a stranded barge just upstream from the Niagara Falls
[4] Excluding data for Lake Erie for which 1977 and 1990 data were incomplete

Table 5. Changes in nest numbers of Great Black-backed Gulls on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	0	0	0	0
Lake Erie ('77)[1]	0	0	0	0
Niagara River ('77)[1]	0	0	0	0
Lake Ontario ('76)[2]	0	0	2	7
St. Lawrence River ('76)[2]	0	0	1	1
Totals	0	0	3	8

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977

Table 6. Changes in nest numbers of Common Terns on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	1	159	0	0
Lake Erie ('77)[1]	4	1,424	2	1,135
Niagara River ('77)[1]	0	0	0	0
Lake Ontario ('76)[2]	2	1,299	4	1,148
St. Lawrence River ('76)[2]	7	188	7	64
Totals	14	3,070	13	2,347

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977

Table 7. Changes in nest numbers of Caspian Terns on the Canadian lower Great Lakes system, 1976-77 and 1990.

Area	1976-77		1990	
	Colonies	Nests	Colonies	Nests
Detroit River ('77)[1]	0	0	0	0
Lake Erie ('77)[1]	0	0	0	0
Niagara River ('77)[1]	0	0	0	0
Lake Ontario ('76)[2]	2	47	3	765
St. Lawrence River ('76)[2]	0	0	0	0
Totals	2	47	3	765

[1] From Blokpoel and McKeating 1978
[2] From Blokpoel 1977

are creating conflicts with a variety of human interests (Blokpoel and Tessier 1986). When gulls nest in very large numbers on urban or industrial sites, conflicts between the interests of people and gulls become pronounced. At several colony sites affected landowners have carried out gull control operations under special permits issued by CWS (Blokpoel and Tessier 1987 and unpublished data). These operations did not involve the killing of adults or chicks. Ring-billed Gulls also cause concern because they out-compete Common Terns for nesting space (Courtney and Blokpoel 1983) and it is difficult to prevent this encroachment on traditional tern nesting habitat by the earlier nesting ring-bills (Morris et al. in press).

4.3 Herring Gull

We do not know why the larger and more aggressive Herring Gull increased in numbers at a lower rate than the smaller Ring-billed Gull. Although Herring Gulls commonly feed on garbage dumps in the lower Great Lakes area, they have not become urbanized to the same extent as ring-bills. Thus they may be unable to profit from living in the human landscape to the same extent as ring-bills do. Ring-bills, being smaller, are more maneuverable and it is likely that they forage more successfully in certain situations (e.g. feeding behind the plow, plunge diving for fish, and hawking for insects in the air). Another reason for the comparatively slow increase in the Herring Gull population may be the fact that adult Great Lakes Herring Gulls spend the winter in the lower Great Lakes area (and are thus exposed to severe weather conditions possibly resulting in higher over-winter mortality), whereas most Ring-bills migrate from the Great Lakes to the south Atlantic Coast where weather (and thus feeding) conditions are usually better.

Because Herring Gulls breed in much smaller numbers in Ontario than do Ring-billed Gulls, they are much less of a problem than the ring-bills. However, Herring Gulls nesting on roofs can cause considerable inconvenience (Blokpoel and Smith 1988, Blokpoel et al. 1990).

4.4 Great Black-backed Gull

The Great Black-back is essentially a marine species that is slowly establishing itself as a nesting species in the Great Lakes. Since 1954 there has been occasional breeding by single pairs on Lake Ontario and Lake Huron (Angehrn et al. 1979). During 1981-85, the years of fieldwork for the Ontario Breeding Bird Atlas, there were a total of 8 single nests (7 in Lake Ontario and 1 in Lake Huron; Blokpoel 1987).

4.5 Common Tern

The nesting population of the Common Tern on the lower Great Lakes has slowly declined due to a combination of factors including: contaminants (especially in the 1960s and early 1970s), encroachment on nesting habitat by gulls (especially ring-bills) and by vegetation,

predation by mammalian and avian predators, disturbance by people and their dogs, and erosion/inundation of nesting habitat (Morris and Hunter 1976, Courtney and Blokpoel 1983, Blokpoel and Scharf 1991). Management efforts to increase the terns' reproductive success have focussed on Gull Island (Morris et al. 1980), the Eastern Headland (Morris et al. in press, Blokpoel unpub. data), the Port Colborne Breakwall (Morris et al. in press,) and the Hamilton Harbour (D.V. Weseloh, pers. comm.).

4.6 Caspian Tern

During 1976 - 1990 the Caspian Tern colony at Tommy Thompson Park grew from 4 nests in 1976 to 182 nests in 1985, declined during 1986-87, and since 1988 Caspians have not nested at that site. Despite some management efforts, the nesting habitat at Tommy Thompson Park steadily deteriorated due to increasing vegetation around the nesting area, encroachment by Herring and Ring-billed Gulls, disturbance by people and their dogs, and, to an unknown extent, by predators. The decline of the colony at Tommy Thompson Park coincided with the establishment and growth of the new colony at Hamilton Harbour (Dobos et al. 1988), suggesting that most terns relocated from Toronto to Hamilton when more suitable habitat became available there as a result of the East Port Development.

5. ACKNOWLEDGEMENTS

We thank CWS contractors T. Brown; P. Hayes; M. Hortiguela; R. Huizer; S. Janes; S. Kingwell; S. Polischuk and L. Primavesi for carrying out the nest counts in the field. C. Bishop, R. Burnett, R. Chaundy, E. Christens, D. Chubbuck, C. Dunlop, P. Ewins, B. Hennessey, P. Madore, R.D. Morris and D.V. Weseloh provided unpublished data. We are also thankful to R. Dietz; J. Horton; B. Lee; P. Madore; D. Rawlyk and B. Steele for providing transportation by boat to island colonies.

We thank the Hamilton Harbour Commissioners, Hamilton Marine, Metropolitan Toronto and Region Conservation Authority, Ontario Hydro, Presqu'ile Provincial Park, Stelco, St. Lawrence Island National Park, St. Mary's Cement Company, and the Toronto Harbour Commissioners for allowing access to their properties.

S.G. Curtis and R. Pratt, both with CWS, and J. Harcus, Ontario Ministry of Natural Resources, commented on the draft manuscript.

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